

### Final Exam Test Prep

1. What is the molarity of 34.87 grams of Rhenium? (Molar mass of Rhenium: 186.207 g/mol)
2. What is the molality of a solution of 125 moles of sugar dissolved in 0.750 kg of water? What is the boiling point and freezing point of the resulting solution?
3. Find the new freezing point of a solution that has 58.44 g of NaCl in 1.00 kg of H<sub>2</sub>O ( $K_f = 1.86 \text{ C/m}$ ).

4. For the reaction  $2A + B \rightarrow AB$  the following data was observed:

Trial	Initial [A]	Initial [B]	Initial Rate
1	0.480 M	0.190 M	0.350
2	0.480 M	0.380 M	0.350
3	0.240 M	0.190 M	0.087

A) Determine the order of each reactant:

B) Determine the overall order of the reaction:

C) Write the rate law:

D) Calculate the value for k:

5. What is the pH of Be(OH)<sub>2</sub> if  $[H^+] = 0.28 \text{ M}$ ?

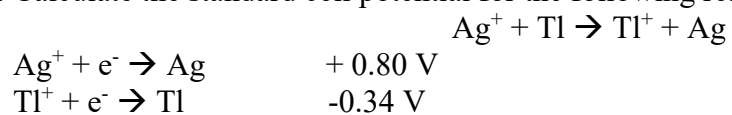
6. A 0.175 M weak acid solution has a pH of 3.25. Find  $K_a$  for the acid:
7. Calculate the pH of a 0.20 M solution of ammonia.  $K_b$  of  $\text{NH}_3$  is  $1.8 \times 10^{-5}$ .  
$$\text{NH}_3 (\text{aq}) + \text{H}_2\text{O} (\text{l}) \rightleftharpoons \text{OH}^- (\text{aq}) + \text{NH}_4^+ (\text{aq})$$
8. Calculate the pH of a buffer composed of 0.10 M acetic acid ( $\text{CH}_3\text{COOH}$ ) and 0.60 M ( $\text{CH}_3\text{COO}^-$ ) knowing that the acid dissociation constant is  $1.8 \times 10^{-5}$ .
9. Estimate the molar solubility of  $\text{CaF}_2$  at 25 C in 0.010 M  $\text{Ca}(\text{NO}_3)_2$  solution.
10. If the standard enthalpy of a reaction is -128.13 kJ and its standard entropy is -332.5 J/K. What is the change in Gibbs free energy? Is the reaction spontaneous?
11. For the reaction
- $$\text{SO}_2 (\text{g}) + 2\text{H}_2\text{S} (\text{g}) \rightarrow 3\text{S} (\text{s}) + 2\text{H}_2\text{O} (\text{g})$$

	$\Delta H$	$\Delta S$
SO <sub>2</sub>	-296.8	0.2481
H <sub>2</sub> S	-20.6	0.2057
S	0.0	0.0318
H <sub>2</sub> O	-241.8	0.1887

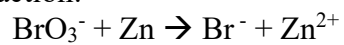
a) Calculate  $\Delta G$ :

b) Is this reaction spontaneous?

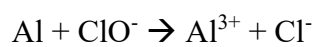
12. Calculate the standard cell potential for the following reaction:



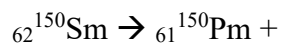
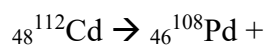
13. Balance the following redox reaction:



14. Balance the following reaction:



15. Complete and identify the following reactions:



16. What would you call a carbon compound with only single bonds between carbons? What bond angles do these compounds have?

17. What would you call a carbon compound with double bonds? What bond angles do these compounds have?

18. What would you call a carbon compound with triple bonds? What bond angles do these compounds have?